

Increased production with automatic control in offshore oil and gas production in Statoil

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Abstract: In the light of the current global digitalization and automation focus, Statoil recognizes the great value of automatic control which also is reflected Statoil's technology strategy. To optimize production from existing and near field resources, safe and efficient operations are key success factors. Statoil's technology strategy states an ambition to be technology leader within automatic production optimization.

Traditionally, the automation level of oil and gas producing offshore platforms has been lower than for comparable onshore facilities like processing plants and refineries. Particularly production and injection wells have been lacking automatic control. Both the equipment, the traditional way of operating wells and their inherent variable nature have led to a higher threshold for automation. However, the last 10 years, Statoil has significantly increased the level of automatic control for production and injection wells.

The implementation of automatic control of production and injection wells ensures automatic compensation for natural variations in the wells in addition to automatic ramp-up of well. Automatic control of production wells typically gives an accelerated production in the range of 3-10% per well due to faster start-up and operating closer to the wells' desired operation points. Another type of application sees wells for actively compensation of disturbances topside, thus enabling operation closer to maximum capacity. The first installation of using so-called swing producers to ensure maximum plant throughput was completed in 2008 and the yearly income by this implementation is about 80 MNOK/year.

Statoil has an ambition of go beyond just constraint chasing, and is also working on real-time production optimization. In this context, that means automatic prioritizing between wells, like distributing which wells to produce from and at what production rate for an overall optimal operation. Development of automatic production optimization solutions are in progress, both model based and model free methods. The main challenge is to make the optimization robust with contributions from measurement and model accuracy and use of feedback.

One of the main success factor of automatic control offshore is the cross disciplinary work process. The core mechanism is a tight and lasting collaboration between a pool of automation engineers and the asset. This build trust and confidence and make the asset utilize the full potential of automatic control where these applications become an integrated part of the tools used by the assets' daily production optimization (DPO) group. The inherent nature of an offshore field is large variations in feed over time, so high degree of application flexibility is desired and frequent modifications are expected. In this way of working, a mindset of utilizing the capacities at all times is developed and new opportunities are seen.

Automatic control is necessary for utilizing Statoil's production capacity and to achieve optimal operation. During the years, Statoil has achieved a lot of experience with offshore automatic control and will build on this competence to raise the level of automation in offshore fields even further.

Keywords: Production control, Automatic control, Implementation, Model Predictive Control
